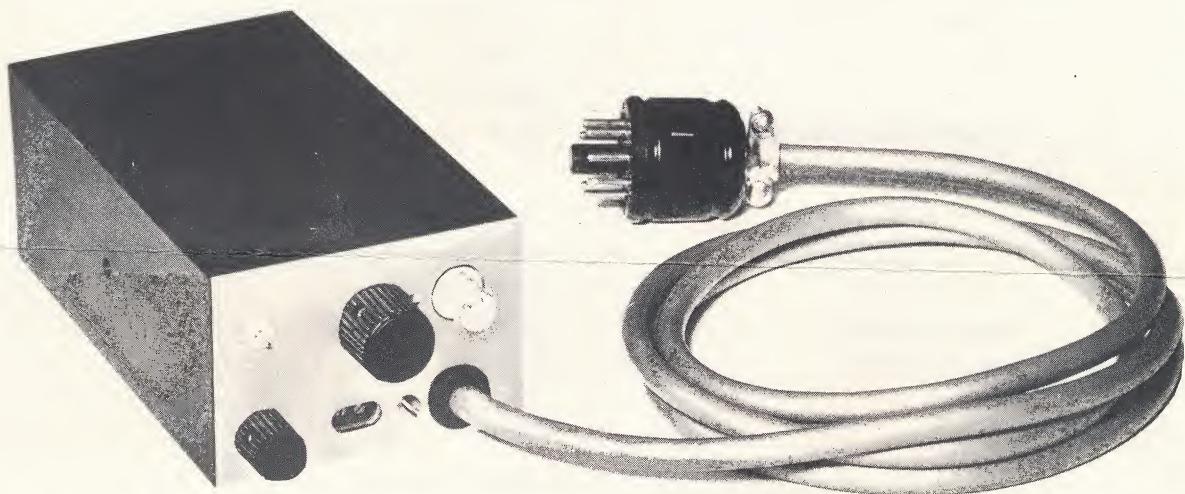


Block Engineering, Inc.

NEGATIVE
CAPACITANCE
BIOLOGICAL
AMPLIFIER

Model
A-2



The Block Engineering, Inc. Model A-2 Negative-Capacitance Biological Amplifier is designed for use with high-impedance micro-electrodes for neurophysiological and cardiological intracellular measurements. In recording intracellular signals with high-impedance glass or metal micro-electrodes, it is required that the exact shape of a transient be amplified and reproduced. The micro-electrode signal is, therefore, typically regenerated from an amplifier having in-phase gain greater than unity, through a trimmer capacitor, back to the grid of the input tube. This positive feedback is called "negative capacitance". The negative capacitance of the A-2 restores the high-frequency responses which otherwise would be shunted to ground by the stray capacitance associated with the micro-electrodes, and ensures high-fidelity recording required for the reproduction of intracellular signals.

Significant advantages of the transistorized,

DC Model A-2 over conventional micro-electrode amplifiers includes its small size, high input resistance, low stable grid current, wide dynamic range, and few controls. The Model A-2 is 2 by 3 by 6-1/4 inches overall, has input resistance greater than 10^{12} ohms, and has a grid current range of $\pm 10^{-10}$ adjustable to a 10^{-13} amps stable current. The dynamic range of the amplifier is ± 1 volt. Only three simple controls are required for operation of the amplifier: (1) an output level control, (2) a grid current control, and (3) a negative-capacitance compensator to adjust for the capacity of input circuit to ground.

The mechanical construction of the compact, completely self-contained amplifier emphasizes ruggedness and reliability. The unit may be mounted in a variety of positions for ease of operation, and it is suitable for use with any standard oscilloscope.

MODEL A-2
NEGATIVE CAPACITANCE BIOLOGICAL AMPLIFIER
General Specifications

Gain	1
Output impedance	1000
Rise time, compensated with negative capacitance	through 10 megohms, < 10 μ sec. through 100 megohms, < 50 μ sec.
Noise, peak-to-peak	through 10 megohms, < 0.5 mv. through 100 megohms, < 1.5 mv.
Dynamic range, with respect to ground	\pm 1v
Grid current	range: $\pm 10^{-10}$ amps stable minimum: 10^{-15} amps
Input resistance	> 10^{12} ohms
Input impedance	> 10^8 ohms at 30 kcs
Active elements	1 vacuum envelope, 9 transistors
Size	2 by 3 by 6- $\frac{1}{4}$ inches
Power requirements	
Model A-2 — Note 1	+135v at 10 ma. -6v at 135 ma. -90v at 7 ma.
Model A-2B — Note 2	+30v at 8 ma. +20v at 7 ma. -6v at 135 ma. -20v at 6 ma.
Model B-1	+30v at 16 ma.
Power Supply	+20v at 14 ma. -6v at 270 ma. -20v at 12 ma.

Note 1. Model A-2 is designed for use with Tektronix Model 125 power supply, or with user's batteries.

Note 2. Model A-2B is designed for use with the Block Engineering, Inc. B-1 power supply, or with user's batteries.

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19 Blackstone Street • Cambridge, Massachusetts 02139

DETECTORS — RADIOMETERS — SPECTROMETERS — INTERFEROMETER SPECTROMETERS for UV, Visible, Infrared

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